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EXAMINER	
ODOM, CURTIS B	

ART UNIT	PAPER NUMBER
2634	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/471,659	CLARK ET AL.
	Examiner	**Art Unit**
	Curtis B. Odom	2634

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 June 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2-9,12-17,20-26 and 28-36* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2-9,12-17,20-26 and 28-36* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *19 February 2003* is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 6/29/2005 have been fully considered but they are not persuasive. The present invention as claimed simply takes a well known form of modulation (DMT) and simply uses the modulation in a transmission/reception system in a well-logging environment which uses cables as a propagation medium between the transmitter and receiver. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made that since it is well known that DMT modulation can be used in the presence of cables as shown by Matsumoto and Bae (previously cited in Office Action 1/26/2005), that present invention as claimed does not constitute patentability. Since DMT does not recognize the environment to which it is implemented (in other words, the environment does not affect the process of DMT modulation) it is well known that DMT is also implemented in a plurality of environments including satellite communications, telephony communications, etc. DMT is a transmission method which utilizes multiple carriers for transmission, while most prior transmission methods utilize a single carrier for transmission. The utilization of multiple carriers allows more data to be transmitted with an increase in transmission rate. Therefore, it would have also been obvious to one of ordinary skill in the art to take advantage of DMT modulation rather than a single carrier modulation method.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 21, 22, 24, 25, 28, 29, 31, and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsumoto (previously cited in Office Action 1/26/2005).

Regarding claim 21, Matsumoto discloses a method of operating a system having a first telemetry cartridge (Fig. 1A) and a second telemetry cartridge (Fig. 1B) connected by a wireline cable (telephone line) comprising:

transmitting (column 1, lines 38-47) a known signal (received wave for each channel) on each of a plurality of carriers from the first telemetry cartridge to the second telemetry unit;

measuring (column 1, lines 38-47) at the second telemetry unit the signal-to-noise ratio on the known signal on each of the plurality of carriers;

using (column 1, lines 38-47) the signal-to-noise ratio measurement to determine the number of bits-per constellation to use for each carrier; and

populating (column 1, lines 38-47 and column 5, lines 49-57) a bits-per-carrier table with the bits-per-constellation value for each carrier.

Matsumoto does not disclose the method is implemented in a well-logging system wherein the first and second telemetry cartridges are uphole and downhole telemetry units. However, the method of Matsumoto is simply a step of a modulation method known as DMT. The claim as recited simply takes a well known form of modulation (DMT) and simply uses the modulation in a transmitter/receiver in a well-logging environment which uses cables as a propagation medimm. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made that since it is well known that DMT modulation can be used in the presence of cables, the method of Matsumoto could have been implemented in a well-logging environment. DMT modulation divides the frequency band into discrete subchannels, which allows transmitter to avoid the noisy channels and maximize the bit rate using the best subchannels. DMT is a transmission method which utilizes multiple carriers for transmission, while most prior transmission methods utilize a single carrier for transmission. The utilization of multiple carriers allows more data to be transmitted with an increase in transmission rate. Thus, claim 21 does not constitute patentability.

Regarding claim 22, which inherits the limitations of claim 21, Matsumoto further disclose populating a bits-per-carrier table the first and second telemetry cartridges (column 5, lines 21-32 and lines 49-57).

Regarding claims 24 and 25, which inherit the limitations of claim 21, Matsumoto further discloses obtaining an adjustment parameter and using (column 5, lines 32-48) the adjustment parameter for time/frequency domain equalization. The adjustment parameter is obtained during a training procedure before the start of communication. Matsumoto does not disclose the training procedure includes transmitting a known complex number from the first telemetry cartridge to

the second telemetry cartridge; receiving a transmitted complex number at the second telemetry unit; and dividing the receive complex number by the known complex number to obtain an adjustment parameter. However, it would have been obvious to one skilled in the art at the time the invention was made the procedure used to update the coefficients (adjustment parameters) of the equalizer would not the change the functionality of the device/method as disclosed by Matsumoto. The function of the equalizers would not change based on the procedure used to update the coefficients. Thus, claims 24 and 25 do not constitute patentability.

Regarding claim 28, Matsumoto discloses a method of operating a system having a device (Fig. 3, 6a) and a second device (Fig. 3, 6b) connected by a wireline cable (telephone line) comprising:

modulating (Fig. 4, column 9, line 26-column 10, line 23) a bit stream onto a plurality of carrier frequencies;

transmitting (Fig. 4, column 9, line 26-column 10, line 23) the modulated bit stream on a first propagation mode from the first device to the second device;

operating (Fig. 4, column 6, line 43-column 7, line 63) the second device to demodulate the received bitstream;

using (column 1, lines 38-47, column 5, lines 49-56, and column 12, lines 17-32) a training sequence to populate a bits-per-carrier table in the first device and a bits-per-carrier table in the second device;

wherein (column 1, lines 38-47, column 5, lines 49-56, and column 14, lines 17-32) the step of modulating the bit stream onto a plurality of carrier frequencies modulates the bit stream

for each carrier according to values stored in the downhole bits-per-carrier table for such each carrier; and

wherein the step of demodulating the bit stream demodulates the bit stream from each carrier according to values stored in the uphole bits-per-carrier table (column 1, lines 38-47, column 5, lines 49-56, and column 14, lines 17-32).

Matsumoto does not disclose the method is implemented in a well-logging system wherein the first and second devices are uphole and downhole telemetry units.

However, the method of Matsumoto is simply a modulation method known as DMT. The claim as recited simply takes a well known form of modulation (DMT) and simply uses the modulation in a transmitter/receiver in a well-logging environment which uses cables as a propagation meduim. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made that since it is well known that DMT modulation can be used in the presence of cables, the method of Matsumoto could have been implemented in a well-logging environment. DMT modulation divides the frequency band into discrete subchannels, which allows transmitter to avoid the noisy channels and maximize the bit rate using the best subchannels. Thus, claim 28 does not constitute patentability.

Regarding claim 29, Matsumoto discloses a method of operating a system having a device (Fig. 3, 6a) and a second device (Fig. 3, 6b) connected by a wireline cable (telephone line) comprising:

modulating (Fig. 4, column 9, line 26-column 10, line 23) a bit stream onto a plurality of carrier frequencies;

transmitting (Fig. 4, column 9, line 26-column 10, line 23) the modulated bit stream on a first propagation mode from the first device to the second device;

operating (Fig. 4, column 6, line 43-column 7, line 63) the second device to demodulate the received bitstream;

using (column 1, lines 38-47, column 5, lines 49-56, and column 12, lines 17-32) a training sequence to populate a gain table in the first device and a gain table in the second device; and

adjusting the gain on each carrier based on values stored in the gain table of a first device (column 1, lines 38-47, column 5, lines 49-56, and column 12, lines 17-32).

Matsumoto does not disclose the method is implemented in a well-logging system wherein the first and second devices are uphole and downhole telemetry units.

However, the method of Matsumoto is simply a modulation method known as DMT. The claim as recited simply takes a well known form of modulation (DMT) and simply uses the modulation in a transmitter/receiver in a well-logging environment which uses cables as a propagation meduim. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made that since it is well known that DMT modulation can be used in the presence of cables, the method of Matsumoto could have been implemented in a well-logging environment. DMT modulation divides the frequency band into discrete subchannels, which allows transmitter to avoid the noisy channels and maximize the bit rate using the best subchannels. Thus, claim 29 does not constitute patentability.

Regarding claims 31 and 32, which inherits the limitations of claims 21 and 28, Matsumoto discloses using a wireline cable for transmission (column 5, lines 17-20), but

Matsumots does not discloses using a heptacable wireline cable. However, it would have been obvious to one skilled in the art at the time the invention that the use of a certain cable in a certain environment can reduce telemetry signal distortion. Therefore, the use of a heptacable is deemed a design choice and does not constitute patentability.

4. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bae et al. (previously cited in Office Action 1/26/2005).

Regarding claim 26, Bae et al. discloses a method of operating a system having a device (Fig. 1 and Fig. 8) and a second device (Fig. 2 and Fig. 8) connected by a wireline cable comprising:

transmitting (column 4, lines 26-35) a signal of known power level on each of a plurality of carriers from the first device to the second device;

measuring (Fig. 5, step 400, column 4, line 36-column 5, line 25) the signal amplitude received on each carrier;

comparing (Fig. 5, steps 404, 406, and 408, column 4, line 36-column 5, line 25) the power level received on each carrier to a predetermined maximum power level for each carrier

based (Fig. 5, step 410, column 4, line 36-column 5, line 25) on the comparison of the power level, transmitting an indication to adjust the power level on at least one of the carriers from the second device to the first device; and

adjusting (Fig. 5, step 410, column 4, line 36-column 5, line 25) the power level of at least one of the carriers based on the indication received.

Bae et al. does not disclose the method is implemented in a well-logging system wherein the first and second devices are uphole and downhole telemetry units.

However, Bae et al. does disclose the current method can be implemented into any transmission system adopting a multicarrier method (column 1, lines 7-13) including those systems in which a wireline cable is used as the propagation medium (column 2, lines 17-39). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made that since it is well known that multicarrier modulation can be used in the presence of cables, the method of Bae et al. could have been implemented in a well-logging environment. Thus, claim 26 does not constitute patentability.

5. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Matsumoto (previously cited in Office Action 1/26/2005) in view of Rasmussen (U. S. Patent No. 4, 490, 788).

Regarding claim 23, which inherits the limitations of claim 21, Matsumoto discloses all the limitations of claim 23 (see rejection of claim 21) except at least one of the steps of claim 21 executed concurrently with acquiring well-log data from a well-logging tool.

Rasmussen discloses acquiring well-log data from a well-logging tool while concurrently receiving transmissions signals. Rasmussen discloses implementing a large number of processing systems which allow multiple functions to be performed simultaneously the measurement of well-logging systems to be executed concurrently with the processing of these measurements. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made the method of Matsumoto could have been implemented to execute concurrently with step of acquiring well-logging data in a well-logging environment as taught by Rasmussen. By executing these steps simultaneously in a well-logging environment, the processing speed in the well-logging device would be increased.

6. Claims 8, 12, 13, 20 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gardener et al (previously cited in Office Action 9/8/03) in view of Isaksson et al. (previously cited in Office Action 3/19/2004).

Regarding claim 8, Gardener et al. discloses a telemetry system for transmitting well-logging data from at least one downhole tool to a surface data acquisition system, the at least one downhole tool having a first tool data input/output interface, the telemetry system comprising:

a down hole telemetry cartridge (Fig. 1, block 17) connected to at least one down hole tool (Fig. 1, block 14) via a second tool data input/output interface (Fig. 1, block 16) connected to the first tool data input/output interface, wherein the downhole telemetry receives a bitstream for the at least one downhole tool over the second input/ouput interface (column 1, lines 64-67) and comprising:

a transmitter (Fig. 1, block 17 and Fig. 2, column 3, lines 10-15) connected to the second tool data input/output interface having a logic operable to cause the transmission of signals to an uphole telemetry unit connected to the downhole telemetry cartridge by a wireline, and

a cable driver (Fig. 2, cable driver) having transmission power level control circuitry having logic to control the transmission power to optimize the total transmission power applied to the wireline cable as a function of a received signal which is a function of cable length, cable material, cable temperature, and cable geometry, wherein it is conventional to implement a cable driver as an amplifier (Fig. 10) to increase the transmission power of the carrier frequency to create a signal suitable for transmission over the cable; and

an uphole telemetry unit (Fig. 1, block 10) connected to the surface data acquisition system via an acquisition computer interface (Fig. 1, block 29) and comprising:

a receiver (Fig. 1, block 28 and Fig. 3, column 3, lines 16-23) connected to the surface data acquisition system having logic operable to receive the analog signals, to demodulate the received signals into a bit stream and to output the bit stream to the acquisition computer via the acquisition computer interface; and

a wireline cable (Fig. 1, block 11, column 3, lines 24-32) providing an electrical connection between the downhole telemetry cartridge and the uphole telemetry unit, wherein the analog signals are transmitted in an uphole direction on the wireline cable.

Gardener et al. does not disclose the apparatus having logic operable to cause transmission of the bitstream as analog signals on a plurality of carrier frequencies and logic operable to receive the analog signals on the plurality of carrier frequencies and optimizing the the total transmission power applied to the wireline as function of a received adjustment signal transmitted from the uphole telemetry unit which includes logic to measure the received signal amplitude and to transmit the received adjustment signal to the downhole telemetry cartiridge.

However, Isaksson et al. discloses logic (Fig. 4, column 6, lines 20-24 and column 8, line 24-column 9, line 20) operable to cause transmission of the bitstream as analog signals on a plurality of carrier frequencies and logic operable to receive the analog signals on the plurality of carrier frequencies by the use of DMT modulation and logic to control . DMT modulation causes transmission of the bitstream as analog signals on a plurality of carrier frequencies. Isaksson also discloses controlling transmission power level of each carrier at the transmitter by measuring a signal-to-noise ratio at the receiver (column 7, lines 5-20) and determining the number of bits transmitted on each carrier based on a channel estimation and transmitting this information back to the transmitter to adjust the power level of the transmitter (column 8, lines 61-67) Therefore, it

would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the transmitter and receiver of Gardener et al. with the transmitter and receiver logic of Isaksson et al. because DMT modulation divides the frequency band into discrete subchannels, which allows transmitter to avoid the noisy channels and maximize the bit rate using the best subchannels. It would have also been obvious to one of ordinary skill in the art at the time the invention was made to modify the transmitter and receiver of Gardener et al. with the transmission power control logic of Isaksson et al. to control transmission power level of each carrier at the transmitter by measuring a signal-to-noise ratio at the receiver (column 7, lines 5-20) to produce a more reliable transmission signal from the receiver when transmission power is increased and to decrease power consumption when transmission power is decreased.

Regarding claims 12 and 13, Gardener et al. and Isaksson et al. disclose all the limitations of claims 12 and 13 (see previous rejection of claim 8) except for the receiver comprising logic operable to cause transmission from the receiver to cable driver of a control signal indicative to the transmission power level control circuitry to increase or decrease the total transmission power applied to the wireline cable or for a carrier frequency. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made that since Isaksson et al. discloses controlling transmission power level of each carrier at the transmitter by measuring a signal-to-noise ratio at the receiver (column 7, lines 5-20) that logic used to increase or decrease the total transmission power in the transmitter could have also been implemented into the receiver of the well-logging system. The implemented logic would produce a more reliable transmission signal from the receiver.

Regarding claim 20, which inherits the limitations of claim 8, Gardener et al. further discloses the downhole telemetry cartridge is constructed from components capable of operation at temperatures above 150 degrees Celsius (column 3, lines 51-64).

Regarding claims 30, which inherits the limitations of claim 9, Gardener discloses using a wireline cable for transmission (column 3, lines 24-50), but Gardener et al. does not discloses using a heptacable wireline cable. However, Gardener et al. discloses that telemetry signal distortion is a function of cable length, type, and manufacturer (column 1, lines 24-27). Therefore, it would have been obvious to one skilled in the art at the time the invention that the use of a certain cable can reduce telemetry signal distortion. Therefore, the use of a heptacable is deemed a design choice and does not constitute patentability.

7. Claims 14, 15, and 33-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gardener et al (previously cited in Office Action 9/8/03) in view of Matsumoto (previously cited in Office Action 1/26/2005).

Regarding claim 14, Gardener et al. discloses a telemetry system for transmitting well-logging data from at least one downhole tool to a surface data acquisition system, the at least one downhole tool having a first tool data input/output interface, the telemetry system comprising:

a down hole telemetry cartridge (Fig. 1, block 17) connected to at least one down hole tool (Fig. 1, block 14) via a second tool data input/output interface (Fig. 1, block 16) connected to the first tool data input/output interface, wherein the downhole telemetry receives a bitstream for the at least one downhole tool over the second input/ouput interface (column 1, lines 64-67) and comprising:

a transmitter (Fig. 1, block 17 and Fig. 2, column 3, lines 10-15) connected to the second tool data input/output interface, and

an uphole telemetry unit (Fig. 1, block 10) connected to the surface data acquisition system via an acquisition computer interface (Fig. 1, block 29) and comprising:

a receiver (Fig. 1, block 28 and Fig. 3, column 3, lines 16-23) connected to the surface data acquisition system having logic operable to receive the analog signals, to demodulate the received signals into a bit stream and to output the bit stream to the acquisition computer via the acquisition computer interface; and

a wireline cable (Fig. 1, block 11, column 3, lines 24-32) providing an electrical connection between the downhole telemetry cartridge and the uphole telemetry unit, wherein the analog signals are transmitted in an uphole direction on the wireline cable.

Gardener et al. does not disclose the apparatus having logic operable to cause transmission of the bitstream as analog signals on a plurality of carrier frequencies and logic operable to receive the analog signals on the plurality of carrier frequencies wherein the logic includes:

a tone ordering logic operable to divide the bit stream into bit groups such that there is a one-to-one mapping between bit groups and carrier frequencies;

a bits-per-carrier table containing a mapping between each bit group and the number of bits allocated to each carrier for one cycle of operation; and

a constellation encoder connected to receive the bit groups from the tone ordering logic and the bits-per-carrier from the bits-per-carrier table, and operable to encode the bit groups as complex numbers.

Matsumoto discloses an apparatus (Fig. 2 and Fig. 4) which can be enclosed in a transmitter/receiver (modem) having logic operable to cause transmission of the bitstream as analog signals on a plurality of carrier frequencies and logic operable to receive the analog signals on the plurality of carrier frequencies by use of DMT modulation, wherein the logic includes:

a tone ordering logic (Fig. 4, block 88, column 10, lines 14-42) operable to divide the bit stream into bit groups such that there is a one-to-one mapping between bit groups and carrier frequencies;

a bits-per-carrier table (Figs. 2 and 4, blocks 79 and 80, column 1, lines 38-47, column 5, lines 49-57 and column 12, lines 16-32) containing a mapping between each bit group and the number of bits allocated to each carrier for one cycle of operation; and

a constellation encoder (Fig. 4, block 89, column 10, lines 43-53 and column 12, lines 16-32) connected to receive the bit groups from the tone ordering logic and the bits-per-carrier from the bits-per-carrier table, and operable to encode the bit groups as complex numbers.

DMT modulation causes transmission of the bitstream as analog signals on a plurality of carrier frequencies. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the transmitter and receiver of Gardener et al. with the transmitter and receiver logic of Matsumoto because DMT modulation divides the frequency band into discrete subchannels, which allows transmitter to avoid the noisy channels and maximize the bit rate using the best subchannels. DMT is a transmission method which utilizes multiple carriers for transmission, while most prior transmission methods utilize a single carrier for transmission. The utilization of multiple carriers allows more data to be transmitted with an

increase in transmission rate. Therefore, it would have also been obvious to one of ordinary skill in the art to take advantage of DMT modulation rather than a single carrier modulation method.

Regarding claim 15, which inherits the limitations of claim 14, Matsumoto further discloses a training logic operable to populate the bits-per-carrier table (column 1, lines 37-47 and column 5, lines 49-57).

Regarding claim 33, which inherits the limitations of claim 14, Gardener et al. further discloses the downhole telemetry cartridge is integrated into one of the at least one downhole tool (Fig. 2, column 2, lines 29-30).

Regarding claims 34, which inherits the limitations of claim 14, Gardener discloses using a wireline cable for transmission (column 3, lines 24-50), but Gardener et al. does not discloses using a heptacable wireline cable. However, Gardener et al. discloses that telemetry signal distortion is a function of cable length, type, and manufacturer (column 1, lines 24-27). Therefore, it would have been obvious to one skilled in the art at the time the invention that the use of a certain cable can reduce telemetry signal distortion. Therefore, the use of a heptacable is deemed a design choice and does not constitute patentability.

Regarding claim 35, which inherits the limitations of claim 14, Gardener et al. further discloses the downhole telemetry cartridge is constructed from components capable of operation at temperatures above 150 degrees Celsius (column 3, lines 51-64).

8. Claim 36 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bae et al. (previously cited in Office Action 1/26/2005) in view of Van Kerchove (U. S. Patent No. 5, 812, 599).

Regarding claim 36, Bae et al. discloses all the limitations of claim 36 (see rejection above) except determining whether an increase in power level would improve the bits-per-carrier for the each carrier and whether a decrease in power level would degrade the bits-per-carrier for the each carrier; and

wherein in the transmitting step, based on both the comparison of power level and determination of improvement or degradation in bits-per-carrier for at least one of the carriers, the indication to adjust the power level on the at least one of the carriers indicates to increase the power level if an improvement in number of bits-per-carrier may be achieved by a permissible increase in power and wherein the indication to adjust the power level on the at least one of the carriers indicates to lower the power level if there would be no degradation in the number of bits-per-carrier by lowering the power level.

Van Kerchove discloses determining whether an increase in power level would improve the bits-per-carrier for the each carrier (column 11, line 20-column 12, line 23) and whether a decrease in power level would degrade the bits-per-carrier for the each carrier (column 12, line 36-column 13, line 39, wherein the decision is based on a calculated noise margin); and

wherein in the transmitting step, based on both the comparison of power level and determination of improvement or degradation in bits-per-carrier for at least one of the carriers, the indication to adjust the power level on the at least one of the carriers indicates to increase the power level if an improvement in number of bits-per-carrier may be achieved by a permissible increase in power (column 4, lines 26-42 and column 11, line 20-column 12, line 23, wherein the improvement is increased data elements) and wherein the indication to adjust the power level on the at least one of the carriers indicates to lower the power level if there would be no degradation

in the number of bits-per-carrier by lowering the power level (column 5, lines 14-25 and column 12, line 36-column 13, line 39, wherein the degradation is decreased noise margin).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the multicarrier transmission method of Bae et al. with the teachings of Van Kerchove since Van Kerchove states that his method allows the global capacity of the carriers to be enlarged and maximizes the minimum additional noise margins amongst the carriers which renders data transmission less sensitive for noise (column 5, lines 4-25).

9. Claims 2-7 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gardener et al (previously cited in Office Action 9/8/03) in view of Isaksson et al. (previously cited in Office Action 3/19/05) in further view of Baird et al. (previously cited in Office Action 9/8/03).

Regarding claim 2, which inherits the limitations of claim 9, Gardener et al. further discloses the downhole telemetry cartridge is integrated into one of the at least one downhole tool (Fig. 2, column 2, lines 29-30).

Regarding claim 3, which inherits the limitations of claim 9, Gardener et al. further discloses the downhole telemetry cartridge further comprises a sample clock operating at a sampling rate within the range of 300 kHz to 500 kHz (column 6, lines 16-23 and column 7, lines 21-25), wherein the uphole receiver contains a clock recovery circuit, therefore, the downhole cartridge must contain a clock which operates at the system frequency of 360 kHz, which is between 300 kHz and 500 kHz.

Regarding claim 4, which inherits the limitations of claim 9, Gardener et al. further discloses a cable driver connected to the cable interface (Fig. 2, cable driver) and having power

optimization logic to adjust total output power of the analog signal to a power level optimized for the wireline cable (column 3, lines 16-19), wherein amplifying the power to a convenient level adjusts total output power of the analog signal to a power level optimized for the wireline cable.

Regarding claim 5, which inherits the limitations of claim 4, Gardener et al. further discloses a cable driver, (Fig. 2, cable driver) but does not disclose the cable driver operating from a voltage supply range of at least –15 to 15 volts. However, it would have been obvious to one of ordinary skill in the art at the time the invention that using a cable driver of this range is a design choice used to obtain a specific power level in a signal. Therefore, this claim does not constitute patentability.

Regarding claim 6, which inherits the limitations of claim 4, Gardener et al. further discloses a cable driver, (Fig. 2, cable driver) but does not disclose the cable driver driving the total output power to the maximum input tolerance power level of the receiver. However, it would have been obvious to one skilled in the art at the time the invention was made to include this feature because using the maximum power would allow for the use of the maximum bit rate for transmission in that channel. Therefore, this feature does not constitute patentability.

Regarding claim 7, which inherits the limitations of claim 6, Gardener et al. further discloses the cable driver (Fig. 2, cable driver) operates to drive the total output power without consideration for cross-talk with other signals, wherein there is no mention that the cable driver of Gardener et al. takes cross-talk into account while driving the signal.

Regarding claim 9, Gardener et al. and Isaksson et al. disclose all the limitations of claim 9 (see previous rejection of claim 8) including an uphole transmitter operable to transmit signals from the data acquisition system to the at least one down hole tool (Fig. 1, block 10, Gardener et

al) and transmitting using a propagation mode which comprises a pilot tone (column 15, line 23-column 16, line 7, pilot carrier, Isaksson et al.) Neither disclose the control signals are transmitted simultaneously on the wireline cable in a second propagation mode that is different from the first propagation mode.

However, Baird et al. discloses transmitting controls signals in a wireline well-logging telemetry system simultaneously on a wireline cable to a down hole tool in a second propagation mode that is different from the first propagation mode (column 5, line 1-column 6, line 16 and column 10, lines 40-60), wherein each power transmission mode is a different propagation mode and the table (column 10) shows a different mode is used for uplink and down link transmission. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the teachings of Baird et al. into the device of Gardener et al. and Isaksson et al. in order to avoid using separate cables to transmit each signal which reduces the cost and increases the reliability of the device.

10. Claims 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gardener et al (previously cited in Office Action 9/8/03) in view of Matsumoto (previously cited in Office Action 1/26/2005) and in further view of Tzannes et al. (previously cited in Office Action 1/26/2005).

Regarding claim 16, Gardener et al. and Matsumoto disclose all the limitations of claim 15 (see rejection of claim 15) including the first device comprising logic operable to transmit a known signal on each of a plurality of carriers and the second device comprising logic operable to measure the signal-to-noise ratio on the received known signal; and logic operable to determine the number of bits-per-carrier as a function of the signal-to-noise ratio (Matsumoto,

Figs. 2 and 4, column 1, lines 38-47, column 5, lines 19-57 and column 12, lines 16-32). Gardener et al. and Matsumoto do not disclose the first device contains logic operable to receive the number of bits-per-carrier from the second device and the second device contains logic operable to cause transmission of the number of bits-per-carrier to the first device.

However, Tzannes et al. discloses, in a second device (receiver), logic operable to measure the signal-to-noise ratio on the received known signal; and logic operable to determine the number of bits-per-carrier as a function of the signal-to-noise ratio (column 5, lines 16-30). Tzannes et al. also discloses the second device contains logic operable to cause transmission of the number of bits-per-carrier to a first device (transmitter) and the first device contains logic operable to receive the number of bits-per-carrier from the second device (column 5, lines 16-30). Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify the apparatus of Gardener et al. and Matsumoto with the teachings of Tzannes et al. since Tzannes et al. states that in order for the receiver to correctly interpret the received data, both the first device and the second device must use the same bits-per-carrier table (column 2, lines 19-36). Thus, the transmission of the table from one device to the other would help to ensure the receiver correctly interprets the received data.

Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Patel et al. (U. S. Patent No. 6, 124, 898) discloses updating coefficients in equalizers by the division a received complex number.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Curtis B. Odom whose telephone number is 571-272-3046. The examiner can normally be reached on Monday- Friday, 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on 571-272-3056. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Curtis Odom
September 13, 2005

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